

Name: _____
PC: Inverses

Date: _____

The functions f and g are **inverse functions** if $f(g(x)) = g(f(x)) = x$.

Example 1:

Let $f(x) = 2x + 1$ and $g(x) = \frac{x-1}{2}$, are f and g inverse functions?

The symbol f^{-1} is often used for the inverse of function f . The inverse “undoes” or reverses what the function has done. The inverse of a function interchanges the domain and range. That is for every point (a, b) on the graph of f , there is a point (b, a) on the graph of the inverse of f . The graphs of a function and its inverse are symmetric with respect to the line $y = x$.

Example 2:

Let $g(x) = \{(1, 2), (2, 2), (3, 2), (4, 2), (5, 2)\}$, find the inverse of g ? Is the inverse also a function?

Example 3:

Let $f(x) = 2x - 3$, find the inverse of f ? Is the inverse also a function?

A function whose inverse is also a function is called one to one. (can also be written as 1-1) It is easy to detect a one to one function from its graph using the **horizontal line test**. A function is 1-1 if and only if no horizontal line intersects the graph more than once.

Example 4:

Let $h(x) = x^2$, find the inverse of h ? Is $h(x)$ one to one?

We can make the inverse of h from example 4 a function by restricting its domain.

Practice:

Inverse Relations

Find the inverse for each relation.

1. $\{(1, -3), (-2, 3), (5, 1), (6, 4)\}$ 2. $\{(-5, 7), (-6, -8), (1, -2), (10, 3)\}$

Finding Inverses

Find an equation for the inverse for each of the following relations.

3. $y = 3x + 2$ 4. $y = -5x - 7$ 5. $y = 12x - 3$
6. $y = -8x + 16$ 7. $y = \frac{2}{3}x - 5$ 8. $y = -\frac{3}{4}x + 5$
9. $y = -\frac{5}{8}x + 10$ 10. $y = \frac{1}{2}x + 8$ 11. $y = x^2 + 5$
12. $y = x^2 - 4$ 13. $y = (x + 3)^2$ 14. $y = (x - 6)^2$
15. $y = \sqrt{x - 2}, y \geq 0$ 16. $y = \sqrt{x + 5}, y \geq 0$ 17. $y = \sqrt{x} + 8, y \geq 8$
18. $y = \sqrt{x} - 7, y \geq -7$

Verifying Inverses

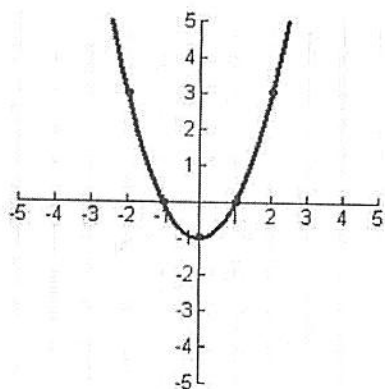
Verify that f and g are inverse functions.

19. $f(x) = x + 6, g(x) = x - 6$ 20. $f(x) = 5x + 2, g(x) = \frac{x - 2}{5}$
21. $f(x) = -3x - 9, g(x) = -\frac{1}{3}x - 3$ 22. $f(x) = 2x - 7, g(x) = \frac{x + 7}{2}$
23. $f(x) = -4x + 8, g(x) = -\frac{1}{4}x + 2$ 24. $f(x) = \frac{1}{2}x - 7, g(x) = 2x + 14$

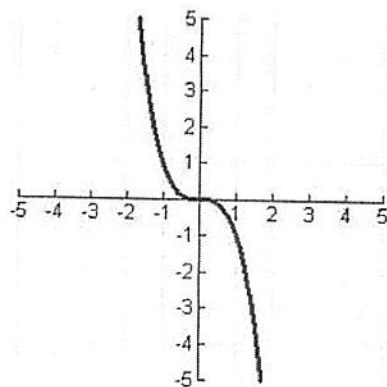
Graphing Inverses

Graph the inverse for each relation below (put your answer on the same graph).

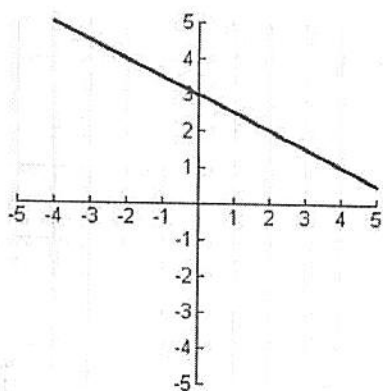
25.



26.



27.



28.

